

## Basic Information

<b>Course Code</b>	
<b>Course Title</b>	Seed health testing methods
<b>Academic Year</b>	2022/2023
<b>Academic Program</b>	New Professional Diploma in Plant Clinic and Phytosanitary Technologies
<b>Hours/week semester</b>	Lectures: 2 Practical: 2 Total: 3

**Course Description:** Seed-borne pathogens and symptoms of seed infection; seed health testing procedures and pathogen isolation, seed borne diseases and infection tolerance levels. Control of seed borne pathogens.

Upon completion, students will be able to find, interpret, and use scientific literature on seed borne diseases and describe the main seed borne diseases affecting crops in Egypt; Describe and carry out routine seed health test procedures

### 1. Course Aims

- 1.1- To list common seed borne diseases of field and horticulture crops
- 1.2- To know the mode of types seed borne infection and its transmission.
- 1.2- To gain knowledge and skill in seed morphology and anatomy.
- 1.3- To know ISTA standard rules.
- 1.4- Determine the basic principles of seed health testing methods
- 1.5- Describe the type of damage caused by seed borne pathogens
- 1.6- Detect seed infestation with insects during storage.
- 1.7- Manage seed borne infection with proper seed treatment method
- 1.8- Review different approaches to control and minimize seed borne infection on yield
- 1.9- To manage the modern techniques of seed priming technology.

### 2. Intended Learning Outcomes

#### 2.1. Knowledge and Understanding

On successful completion of this course, the student should be able to

- 2.1.1- Mention the different seed borne pathogen categories.
- 2.1.2- Understand the development of seed infection in field and storage
- 2.1.3- Know the different types of seed borne pathogens transmission.
- 2.1.4- Recognize the seed infection thresholds and ISTA standard rules
- 2.1.5- Diagnose seed viability and infection
- 2.1.5- Identify seed borne pathogens or insects associated with samples

#### 2.2. Intellectual Skills

By the end of this course, the student should be able to

- 2.2.1- Conclude the causes of seed samples infection
- 2.2.2- Evaluate the appropriate methods for seed health testing
- 2.2.3- Employs the information on seed technology, seed physiology and seed pathology
- 2.2.4- Measure the infection threshold of seed samples

#### 2.3. Practical and Professional Skills

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- By the end of this course, the student should be able to
- 2.3.1- Distinguish between internal and external contamination of seed borne infections
  - 2.3.2- Determine the proper strategy for seed health testing and seed dressing methods
  - 2.3.3- Utilize standard laboratory procedures and techniques in experimental application for seed borne pathogen detection.
  - 2.3.4- Plan protocols for seed borne diseases and insects control during storage.
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#### 2.4. General and Transferable Skills

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- By the end of this course, the student should be able to
- 2.4.1- Writes and presents specialized reports to explain different phenomena
  - 2.4.2- Think independently, and solve problems on scientific basis
  - 2.4.3- Communicates with colleagues and works in a research team
  - 2.4.4- Identify roles, tasks, and set clear guidelines and performance indicators
  - 2.4.5- Demonstrates self-learning and continuous capabilities to develop professional skills
  - 2.4.6- Address the community linked problems with considerable attention to the community ethics and traditions
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#### Course content

Topics	Total (hr)	Lectures (hr)	Practical (hr)
Significance of seed health testing in the global seed industry for quality control and phytosanitary certification	3	2	2
Seed-borne diseases and their effect on seed quality, purity, germination and planting value	3	2	2
Seed borne fungi of important field and horticulture crops	3	2	2
Seed borne bacteria of important field and horticulture crops	3	2	2
Seed borne viruses of important field and horticulture crops	3	2	2
Seed transmission of pathogen and mechanism of infection	3	2	2
Seed deterioration during storage, factors affecting physiological change, its implications of seed quality.	3	2	2
Mycotoxins in storage seeds and grains	3	2	2
Seed and grains infection with storage fungi	3	2	2
Seed and grains infestation with storage insects	3	2	2
Morphology and anatomy of healthy and infected seed	3	2	2
Seed treatments and seed conditioning	3	2	2

Seed Health Testing methods	3	2	2
Seed priming techniques	3	2	2
<b>Total</b>	42	28	28

**Course Matrix for Achievement of Intended Learning Outcomes**

	Topics	H o u r s	K & U								IS								P & PS							G & TS			
			1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	1	2	3	4
1	Significance of seed pathology	4																											
2	Seed-borne diseases and their effect on seed quality,	4																											
3	Seed borne fungi	4																											
4	Seed borne bacteria	4																											
5	Seed borne viruses	4																											
6	Seed transmission of pathogen	4																											
7	Seed deterioration during storage,	4																											
9	Mycotoxins in storage seeds and grains	4																											
10	Seed and grains infection with storage fungi	4																											
11	Seed and grains infestation with storage insects	4																											
12	Morphology and anatomy of healthy and infected seed	4																											
13	Seed treatments and seed conditioning	4																											
14	Seed Health																												

Testing methods	4																		
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#### 4. Teaching and Learning Methods

Lectures:	Interactive lectures through: <ul style="list-style-type: none"> <li>• Teaching lectures to gain knowledge and understanding skills</li> <li>• Seminars</li> <li>• Group discussions</li> </ul>
Practical sessions:	<ul style="list-style-type: none"> <li>• Laboratory lessons (Practical sessions) to gain practical skills</li> <li>• Field visits</li> </ul>
Self-Learning activities:	<ul style="list-style-type: none"> <li>• Assays and reporting in different topics</li> <li>• Analyze the results and reach specific conclusion</li> <li>• Sample collection, preservation, examination and identification</li> </ul>

#### 5. Teaching and Learning Methods for Students of Limited Capabilities

- Additional revisions for previously taught and difficult topics
- Providing a summary for previous chapter at the end of each one
- Following up student feedbacks

6.1. Methods	6. Student Assessment			
	Intended Learning Outcomes Covered			
	KU	IS	PPS	GTS
Written exams	2.1.1/2.1.2/2.1.3/2.1.4 /2.1.5	2.2.1/2.2.2/2.2.3/2.2.4		
Practical exams			2.3.1/2.3.2/2.3.3/2.3.4	
Oral Exams		2.2.1/2.2.2/2.2.3/2.2.4		2.4.1/2.4.2/2.4.3/2.4.4/2.4.5/2.4.6
Student Activities				2.4.1/2.4.2/2.4.3/2.4.4/2.4.5/2.4.6

KU, knowledge and understanding; IS, intellectual skills; PPS, practical and professional skills; GTS, general and transferable skills

#### 6.2. Exam Description

Written exams	<ul style="list-style-type: none"> <li>• Short essays</li> <li>• Drawing</li> <li>• Multiple choice questions</li> <li>• Comparisons</li> <li>• Giving the scientific term/information</li> <li>• Reasons for what comes</li> </ul>
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Practical exams	<ul style="list-style-type: none"> <li>• Slideshow exams</li> <li>• Practical case studies</li> <li>• Exams on plants of the faculty farm</li> </ul>
Oral exams	<ul style="list-style-type: none"> <li>• The exam committee involves at least 3 examiners</li> <li>• Each evaluates the student by giving a separate score</li> <li>• The scores are then averaged</li> <li>• The student randomly selects question cards</li> </ul>
Student activities	<ul style="list-style-type: none"> <li>• Self-learning activities are evaluated throughout the semester</li> </ul>

6.3. Assessment Schedule		6.4. Weighing of Assessments
Exams and activities	Week (in each semester)	Total (%)
Semester work exam	4 <sup>th</sup> , 8 <sup>th</sup> and 12 <sup>th</sup>	10
Student activities	Throughout the semester	10
Final written exam	15 <sup>th</sup>	50
Final Practical exam	15 <sup>th</sup>	20
Final oral exam	15 <sup>th</sup>	10
<b>Total</b>		<b>100</b>

## 7. List of References

1. Agarwal V.K and J.B. Sinclair. 1993. Principles of Seed Pathology, Vol I& II, CRC Press. Inc. Boca Raton, Florida.
2. Horowitz, A. R., & Ishaaya, I. (2004). Insect pest management: field and protected crops. Springer Science & Business Media.
3. Hutchins, J.D. and Reeves, J.F. (Eds.). 1997. Seed Testing Progress towards the 21st Century. CABI,
4. International Seed Testing Association. International rules for seedtesting. Basserdorf, Switzerland: International Seed Testing Association. 2015.
5. Jangpura, New Delhi. Vishunavat, K. 2007. Seed Health Testing- Principles and Protocols. Kalyani Publs., 24, Daryanganj, New Delhi.
6. Jha, D.K. 1993. A Text Book on Seed Pathology. Vikash Publishing House Pvt. Ltd., 576, Masjid
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8. Maude, R.B. 1996. Seed-borne Diseases and Their Control. CAB International, U.K.
9. Neergaard, P. 1988. Seed Pathology, Vol. I & II Macmillan Press, U.K. Road, Jangpura, New Delhi.
10. Sultana N, AliY, JahanS, Yasmin S. Effect of Storage Durationand Storage Devices on Seed Quality of Boro Rice Variety BRR Idhan 47. J Plant Pathology and Microbiol 8: 2016, pp 392.
11. Suryanarayana, D. 1978. Seed Pathology. Vikash Publishing House Pvt. Ltd., 576, Masjid Road, Wellington.

**Course coordinator:**  
Prof. Dr. -----

**Head of Department:**  
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